

1 **IN THE CLAIMS:**

2 --1. - 8. (Cancelled)

3
4 9. (Original) A multipole device for transferring, trapping and analyzing ions in a mass
5 spectrometer, said multipole device comprising:

6 a plurality of electrodes, said electrodes comprising a plurality of RF electrodes, and at
7 least one first; and

8 second detection electrodes;

9 at least two trapping electrodes; and

10 a differential amplifier having first and second inputs;

11 wherein said plurality of electrodes are arranged such that no two RF electrodes are
12 adjacent and no two detection electrodes are adjacent;

13 wherein all of said first detection electrodes are electrically connected and all of said
14 second detection electrodes are electrically connected;

15 wherein said first detection electrodes are connected to said first input and said second
16 detection electrodes are connected to said second input;

17 wherein one of said trapping electrodes is positioned at each end of said plurality of
18 electrodes is positioned at each end of said plurality of electrodes such that when an appropriate
19 DC potential is applied thereto said ions become trapped within said plurality of electrodes; and

20 wherein said differential amplifier measure the potentials on said detection electrodes to
21 determine the m/z ratio of said ions.

1 10. **(Original)** A multipole device according to claim 9, wherein said plurality of electrodes are
2 arranged in a substantially circular manner.

3
4 11. **(Original)** A multipole device according to claim 9, wherein said plurality of electrodes
5 detect trapped ions by charge induction.

6
7 12. **(Original)** A multipole device according to claim 9, wherein said plurality of electrodes
8 detect ions in the manner of FTICR mass spectrometry.

9
10 13. **(Original)** A multipole device according to claim 9, wherein said apparatus contains four RF
11 electrodes, and four detection electrodes.

12
13 14. **(Original)** A multipole device according to claim 9, wherein said device is linear.

14
15 15. **(Original)** A multipole device according to claim 9, wherein said RF electrodes of said
16 device have the same potential and frequency as said trapping electrodes.

17
18 16. **(Original)** A multipole device according to claim 9, wherein said device is further comprised
19 of a single set of said RF electrodes, and said detection electrodes divide the multipole device
20 into an analyzing section positioned between two trapping sections.

1 17. **(Original)** A multipole device according to claim 16, wherein said detection electrodes in
2 said trapping sections are held at a DC potential to trap ions in said analyzing section.

3
4 18. **(Original)** A linear multipole device for transferring, trapping and analyzing ions in a mass
5 spectrometer, said multipole device comprising:

6 four RF electrodes;

7 four electrodes comprising two first and two second detection electrodes;

8 ~~two trapping electrodes; and~~

9 a differential amplifier having first and second inputs;

10 wherein said electrodes are arranged such that no two RF electrodes are adjacent and no
11 two detection electrodes are adjacent;

12 wherein both of said first detection electrodes are electrically connected and both of said
13 second detection electrodes are electrically connected;

14 wherein said first detection electrodes are connected to said first input and said second
15 detection electrodes are connected to said second input;

16 wherein one of said trapping electrodes is positioned at each end of said electrodes such
17 that when an appropriate DC potential is applied thereto said ions become trapped within said
18 plurality of electrodes; and

19 wherein said differential amplifier measure the potentials on said detection electrodes to
20 determine the m/z ratio of said ions.

1 19. **(Original)** A linear multipole device according to claim 18, wherein all of said electrodes are
2 circularly arranged.

3
4 20. **(Original)** A linear multipole device according to claim 18, wherein said detection electrodes
5 detect trapped ions by charge induction.

6
7 21. **(Original)** A linear multipole device according to claim 18, wherein said detection electrodes
8 detect said ions in the manner of FTICR mass spectrometry.

9
10 22. **(Original)** A linear multipole device according to claim 18, wherein said RF electrodes have
11 the same potential and frequency as said trapping electrodes.

12
13 23. **(Original)** A linear multipole device according to claim 18, wherein said detection electrodes
14 divide said device into three sections comprising one analyzing section located between two
15 trapping sections.

1 24. **(Original)** A method for analyzing ions in a mass spectrometer, said method comprising the
2 steps of:

3 directing ions into a multipole device having an analysis region positioned

4 between, and coaxially with, first and second trapping regions;

5 trapping said ions within said analysis region by creating electric fields across

6 said trapping regions; and

7 analyzing said ions;

8 wherein said analyzing region includes exciting said ions within said analysis region and
9 detecting said ions from within said analysis region.

10
11 25. **(Original)** A method according to claim 24, wherein said ions are detected within said
12 analysis region by a plurality of detection electrodes.

13
14 26. **(Original)** A method according to claim 25, wherein said plurality of detection electrodes
15 comprises four detection electrodes, allowing detection of said excited, ions in two cycles.

16
17 27. **(Original)** A method according to claim 24, wherein said trapping regions are held at a
18 higher DC potential than said analysis region to form a substantially homogeneous quadrupolar
19 field within said analysis region.

20
21 28. **(Original)** A method according to claim 24, wherein said exciting is achieved by applying an
22 electrical pulse between electrodes of said analysis region.

1 29. **(Original)** A method according to claim 28, wherein said exciting causes said ions to move
2 in a substantially circular orbit around a central axis of said analysis region.

3
4 30. **(Original)** A method according to claim 28, wherein said exciting causes said ions to move
5 in a substantially oval orbit around a central axis of said analysis region.

6
7 31. **(Original)** A method according to claim 24, wherein said ions are detected using charge
8 induction.

9
10 32. **(Original)** A method according to claim 24, wherein said ions are detected in the manner of
11 FTICR mass spectrometry.

1 **33. (Original)** A mass analyzer comprising:

2 at least four RF electrodes;

3 at least four detect electrodes; and

4 at least two DC electrodes;

5 wherein said RF electrodes and detect electrodes are arranged in a cylindrically
6 symmetric manner about a central axis;

7 wherein said RF electrodes and detect electrodes have inner surfaces which are arc
8 shaped;

9 wherein every RF electrode is arranged between and parallel with two detect electrodes;

10 wherein every detect electrode is arranged between and parallel with two RF electrodes;

11 wherein sample ions are substantially trapped on the axis of said mass analyzer by the
12 action of an RF electric field generated via said RF electrodes;

13 wherein said sample ions are substantially prevented from exiting the ends of said mass
14 analyzer by the action of a DC electric field generated via said DC electrodes; and

15 wherein said detect electrodes are used to detect the ions in said mass analyzer.

16
17 **34. (Original)** An apparatus according to claim 33, wherein said detecting means utilizes charge
18 induction to detect ions.

19
20 **35. (Original)** An apparatus according to claim 33, wherein at least some of said RF electrodes,
21 DC electrodes, or detect electrodes extend through a pumping restriction.

1 36. **(Original)** An apparatus according to claim 33, wherein at least some of said RF electrodes,
2 DC electrodes, or detect electrodes are used to assist in the transport of ions from an ion source
3 into said mass analyzer.

4
5 37. **(Original)** An apparatus according to claim 35, wherein said electrodes which extend
6 through said pumping restriction are used in part to assist in the transport of ions from an ion
7 source into said mass analyzer. --

1 **IN THE ABSTRACT:**

2 Please amend the abstract as follows:

3 -- An apparatus [A means] and method whereby ions from an ion source can be selected
4 and transferred via a multipole analyzer by inductive detection. Ions generated at an elevated
5 pressure are transferred by a pump and capillary system into a multipole device. The multipole
6 device is composed of one analyzing section with two trapping sections at both sides. When the
7 proper voltages are applied, the trapping sections trap ions within the analyzing region. The ions
8 ~~are then detected by two sets of detection electrodes.--~~